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REMARKS

Applicants respectfully request that the above application, as amended, be reconsidered. Claims 1-5, 7-23 and 25 are currently pending.

Applicants have amended Claims 1, 9, 14 and 22 to recite selectively treating the cladding positioned along one edge of the airfoil with the chemical etchant for a period of time sufficient to selectively remove a portion (or interior section) of the cladding from the surface(s) of the substrate only along that edge of the airfoil. Claims 5 and 18 have been amended similarly to selectively flow the aqueous etchant solution onto the cladding (or interior sections thereof) until the treated cladding (or interior sections) has been selectively removed from the surface(s) of the substrate. Support for these amendments to Claims 1, 5, 9, 14, 18 and 22 can be found in paragraph [0022] at page 9 of the above application.

Applicants have also added new Claim 25 which recites that the nonmetallic composite substrate comprises a resin-fiber matrix. Support for new Claim 25 can be found in paragraph [0013] at page 4, of the above application.

A. Response to Rejection of Claims 1-3, 5-6, 13 and 22 under 35 USC 102(b) as Anticipated by Lada et al

At pages 2-3 of the Office Action (see paragraph 3), the Examiner has again rejected Claims 1-3, 5, 6 (now cancelled), 13 and 22 under 35 USC 102(b) as anticipated by U.S. Patent 4,339,282 (Lada et al):

1. Regarding Claims 1 and 13, the Examiner again says Lada et al discloses a method for removing a metal coating from nickel supper alloys from an airfoil such as gas turbine blades using a chemical etchant, which avoids attacking the nickel super alloy (referring to col. 2, lines 29-47).
2. Regarding Claims 2-3, the Examiner again says Lada et al (referring to col. 2, lines 31-35) teaches a chemical etchant that is an aqueous solution comprising strong acid such as hydrochloric acid and nitric acid.

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3. Regarding Claim 5, the Examiner again says Lada et al (referring to col. 2, lines 39-46) teaches a stripping or removal step that includes a metal-coated supper alloy immersed into the solution for a period of time until the coating is removed from the surface of the super alloy.
4. Regarding Claim 6 (now cancelled), the Examiner says Lada et al (referring col. 1, lines 25-36) inherently teaches a turbine blade that has coating or cladding along an edge of the blade because Lada et al teaches a blade having an edge that is coated with metal, which could be removed.
5. Regarding Claim 22, the Examiner again says Lada et al (referring col. 2, lines 51-58) teaches a substrate that comprises a metal composite such as an alloy and by definition, an alloy is a composite of two different metals.
6. Responding to Applicants' argument that Lada et al does not disclose a process of removing a cladding adhered to a substrate because Lada et al teaches removing an aluminide "coating," the Examiner says that "cladding" is nothing more than a "metal coating on a metal."
7. Responding to Applicants' argument as to Claim 6 (now cancelled) and Claim 24 that Lada et al does not disclose selective removal of the cladding positioned along one edge of the airfoil, the Examiner says that this argument is more specific than the claims "because [the] claims are limited to [removing] the cladding [from] at least one edge of the airfoil but does not claim leaving the other edge intact." Accordingly, the Examiner concludes that Lada et al inherently teaches that the coating is removed from the one edge of the turbine airfoil as claimed.

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Applicants respectfully traverse this rejection. Again, and contrary to what the Examiner suggests, the method of Lada et al is not the same or similar to the method of Claims 1-3, 5, 13 and 22, as amended. Specifically, the method of Lada et al removes an aluminide coating from the nickel super alloy substrate with a stripping solution having nitric and hydrochloric acid. See col. 2, lines 29-35. As pointed out previously, a coating is simply a layer of one substance covering another. See previously submitted page 219 from Merriam Webster's Collegiate Dictionary (Tenth Edition 1997). By contrast, the Applicants' claimed method removes a cladding adhered to a substrate by treating the cladding with the chemical etchant. See, for example, Claim 1. See also previously submitted page 210 from Merriam Webster's Collegiate Dictionary (Tenth Edition 1997) which suggests that a "cladding," unlike coatings in general, is bonded to the substrate. In summary, the "aluminide coating" of Lada et al is not the same as the "cladding adhered to a substrate" that is removed by the method of Claims 1-3, 5, 13 and 22, as amended.

Nonetheless and responsive to the Examiner's comment from point 7 above, Applicants have amended Claims 1, 5 and 22 to further clarify that the claimed method: (a) selectively treats the cladding positioned along the one edge of the airfoil with the chemical etchant (b) for a period of time sufficient to selectively remove a portion (or interior section) of the cladding from the surface(s) of the substrate only along that one edge of the airfoil. Again, in the method of Lada et al, the aluminide coating covers the entire nickel super alloy substrate and is removed in its entirety. In other words, the method of Lada et al does not selectively remove the aluminide coating from the turbine blade, i.e., only along one edge thereof. By contrast, and unlike the Lada et al method, the method of amended Claims 1-3, 5, 13 and 22 selectively treats and removes the cladding adhered to the substrate only along the one edge of the airfoil.

For the forgoing reasons, Applicants submit that Claims 1-3, 5, 13 and 22, as amended, are novel in view of, as well as unobvious over, Lada et al.

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B. Response to Rejection of Claims 4, 7-12 and 14-21 under 35 USC 103(a) as Unpatentable Over Lada et al, in View of Hinson

At pages 4-5 of the Office Action (see paragraph 6), the Examiner has again rejected Claims 4, 7-12 and 14-21 under 35 USC 103(a) as unpatentable over Lada et al, in view of U.S. Patent 5,705,082 (Hinson):

1. The Examiner again relies on Lada et al as per the rejection of Claims 1-3, 5 and 13 and 22, and also to teach (referring to col. 2, lines 51-54) a coating or cladding made of a titanium alloy.
2. Regarding Claim 4, the Examiner again acknowledges that Lada et al fails to teach that the acid is hydrofluoric acid. However, the Examiner again alleges that "in a method for removing metal such as titanium used to form a protective sheath for composites such as a leading edge for a fan blade, [Hinson teaches] using an acid solution which can be hydrochloric, hydrofluoric, sulfuric, nitric acid (referring to col. 2, lines 14-25 and lines 66 to col. 3, lines 2-4). The Examiner therefore again concludes that it would have been obvious invention to combine Hinson's teaching into Lada et al's process "because both the hydrochloric and hydrofluoric acid are functionally equivalent for efficient removal of titanium as taught by Hinson."
3. Regarding Claims 7, 9, 11 and 14, the Examiner again says Hinson (referring to col. 2, lines 21-25) teaches a blade having an internal surface of titanium at the leading edge. The Examiner further concludes it would have been obvious to have an interior and a perimeter section of the coating over a fan blade "because by conventional design a fan blade has a convex side and a concave side."
4. Regarding Claims 8 and 20, the Examiner again says Lada et al (referring to (col. 3, lines 21-22) teaches that the coating thickness is about 0.04 to about 0.08 mm.

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5. Regarding Claim 10, the Examiner again says Hinson (referring to col. 3, lines 34-36) teaches a metal-coated substrate that is treated for a period of time of about 1-20 minutes.
6. Regarding Claims 15-17, the Examiner again says Hinson (referring to col. 3, lines 2-5) teaches that the etchant solution is typically an acid solution such as hydrochloric, hydrofluoric, nitric acid, as well as mixtures thereof.
7. Regarding Claim 18, the Examiner again refers to the rejection of Claim 5.
8. Regarding Claim 19, the Examiner again says it would have been obvious to have a higher thickness in the direction from the interior section to the perimeter section "because at least the interior section is in contact with the etchant solution."
9. Regarding Claim 21, the Examiner again says Hinson (referring to col. 2, lines 21-25) teaches that the blade has a leading edge.
10. Responding to Applicants' argument that Hinson is related to a method of roughening a metal surface, the Examiner says Hinson is applied to show the functional equivalency of hydrochloric and hydrofluoric acid as an efficient etchant of titanium (referring to col. 3, lines 2-20).

Applicants respectfully traverse this rejection. Again, and contrary to what the Examiner suggests, the method of Hinson is not the same or similar to the method of Claims 4, 7-12, 14-21, as amended. As clearly taught by Hinson, his method applies a coating to a metal surface that acts as a temporary barrier to the etchant that attacks the metal surface, and then etches the coated metal surface to roughen it. See col. 1, lines 4-6 and 37-44. By contrast, the method of amended

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Claims 4, 7-12, 14-21, as amended, does not simply roughen the cladding treated with etchant. Instead, the method of these Claims treats the cladding with the etchant so that the cladding can be removed from the substrate that it is adhered to.

Applicants again submit that Claims 7-11 and 14-21, as amended, are distinguishable over Hinson for an additional reason. Hinson nowhere teaches that his method selectively roughens, much less selectively removes, the coating on the metal surface, and especially along only one edge of a turbine blade. By contrast, in the method Claims 7-11 and 14-21, as amended, the cladding positioned along the edge of airfoil is selectively treated and removed from the substrate only along that one edge.

Regarding the Examiner's specific comments on Claim 4, Applicants again respectfully submit that the Examiner's reliance on col. 2, lines 14-25 and line 66 to col. 2, lines 2-4 of Hinson to suggest motivation to substitute hydrofluoric acid for the acids taught by Lada et al is misplaced. All that Hinson teaches is the use of hydrofluoric acid (and other acids such as hydrochloric and nitric acid) to roughen the coated metal surface. There is nothing in Hinson that would suggest hydrofluoric acid would be suitable to selectively remove titanium cladding adhered to a substrate according to the method Claim 4. Applicants have a similar comment on the Examiner's reliance on col. 3, lines 2-5 with regard to the method of Claims 15-17.

Regarding the Examiner's specific comments on Claims 7, 9, 11 and 14, Applicants again respectfully submit that the Examiner's reliance on col. 2, lines 21-25 of Hinson is misplaced. All that this portion of Hinson says is that the internal surface of the titanium leading edge is roughened prior to adhesive bonding to the composite fan blade. Indeed, Hinson does not refer to the internal surface of the substrate. By contrast, the method of Claims 7, 9, 11 and 14 involves the interior sections of the substrate where the cladding is adhered to prior to its removal.

Regarding the Examiner's specific comments on Claims 8 and 20, Applicants again respectfully submit that all that col. 3, lines 21-22 of Lada et al teaches is that the particular coating removed in its method has the indicated thickness. Nothing in this particular teaching would suggest a method of removing cladding have the thickness defined in Claims 8 or 20.

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Regarding the Examiner's specific comments on Claim 10, Applicants again respectfully submit that all that col. 3, lines 34-36 of Hinson teaches is that the coated metal substrate in its method is etched for a period of time within the range of 1-20 minutes. Nothing in this particular teaching would teach or suggest a method of treating cladding adhered to a substrate with an etchant for the time indicated in Claim 10.

Regarding the Examiner's comment on Claim 19, Applicants again respectfully disagree with the Examiner's suggestion that Hinson (or Lada et al) would teach as obviousness treating with an etchant a cladding whose thickness increases in the direction from the interior section to the perimeter section. Nowhere do either of these references teach that the respective methods are used to treat coatings, much less claddings, where the thickness increases in the direction defined by the method of Claim 19.

Regarding the Examiner's comment on Claim 21, all that col. 2, lines 21-25 of Hinson teaches is that a fan blade has a leading edge. Nothing in this reference would suggest that his method can be (or should be) used to selectively roughen, much less selectively remove, cladding that is positioned on the leading edge of the airfoil according to the method of Claim 21.

For the foregoing reasons, Applicants submit that Claims 4, 7-12, 14-21, as amended, are unobvious over Lada et al, even in view of Hinson.

C. Response to Rejection of Claims 23-24 under 35 USC 103(a) as Unpatentable Over Lada et al, in View of EP'286

At pages 5-6 of the Office Action (see paragraph 7), the Examiner has rejected Claims 23-24 under 35 USC 103(a) as unpatentable over Lada et al, in view of EP-1162286 (EP'286):

1. The Examiner acknowledges that Lada et al fails to teach that the substrate for the airfoil can comprise a non-metallic composite. However, the Examiner relies on EP'286 (referring to the abstract and col. 6, lines 14-55) to disclose that, in a method for removing a coating from an airfoil such as a turbine blade, the substrate is usually a metallic or non-metallic composite such as a super alloy and polymer, respectively.

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2. The Examiner further relies on EP'286 (referring to col. 6, lines 48-50) to teach that non-metallic or polymeric substrates are preferable because of their acid-resistance property. The Examiner then concludes that it would have been obvious to combine the EP'286 teaching of functional equivalency of both metallic and non-metallic substrates into the method of Lada et al because of this functional equivalency, and also because of the preference for polymeric substrates with acid-resistant properties taught by EP'286.

Applicants respectfully traverse this rejection. Like Lada et al, EP'286 nowhere teaches selective treatment and removal of cladding from the substrate only along one edge of the airfoil. Indeed, in defining "selective removal" of the coating, EP'286 says this means "removal of a relatively large percentage of the coating, while removing only a very small portion (or none) of the substrate material). See col. 2, lines 31-34 (emphasis added). In other words, EP'286 does not "selectively remove" the coating in the same sense as the cladding that is selectively treated and removed by the method of Claims 23-24.

Applicants further submit that new Claim 25 is distinguishable over Lada et al, even in view of EP'286 for an additional reason. Claim 25 defines the non-metallic composite substrate as comprising a resin-fiber matrix. Nowhere does EP'286 teach that its substrate, including polymeric substrates, can be a resin-fiber matrix.

Applicants further submit that selective treatment of cladding with chemical etchants, such as aqueous acid solutions, for selective removal of the treated cladding from a substrate comprising a resin-fiber matrix according Claim 25 would also not be suggested by EP'286. As taught by EP'286, it is recognized in the art that airfoils made of a polymeric resin have fairly good resistance to acids. However, when a resin is reinforced with fibers (e.g., carbon fibers), it is also known that these fibers can wick water and other aqueous liquids, such as aqueous acid solutions, into the resin. The real possibility of wicking potentially corrosive solutions into the substrate of an airfoil could cause one skilled in the relevant art to consider Applicant's claimed method to be unsuitable, or possibly even undesirable, for removing cladding adhered to such substrates.

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Accordingly, Applicant submits that Claims 23-24 and especially new Claim 24 are unobvious over Lada et al, even in view of EP'286.

D. Conclusion

In conclusion, Applicants submit that Claims 1-5, 7-23 and 25, as amended, are novel and unobvious over the prior art relied on by the Examiner. Accordingly, Applicants respectfully request that the above application be allowed to issue with Claims 1-5, 7-23 and 25, as amended.

Respectfully submitted,

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